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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,633	08/26/2005	Christopher John Howard Wort	266485US6PCT	1368

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EXAMINER

MILLER, DANIEL H

ART UNIT	PAPER NUMBER
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1794

NOTIFICATION DATE	DELIVERY MODE
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01/26/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/529,633	Applicant(s) WORT ET AL.	
	Examiner DANIEL MILLER	Art Unit 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10/1/2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 39-45 and 47-80 is/are pending in the application.
 4a) Of the above claim(s) 57-77 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 39-45, 47-56 and 78-80 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/1/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 39-45, and 47-56, 78-80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito (US 6,641,861) in view of Zhu (US 5,849,413).

3. Saito teaches a heat sink formed from a thin diamond film and a substrate (see figures). The thin diamond film operates as a heat spreader (see column 2), Saito desired a thin layer so that it can match the thermal expansion of adjacent semiconductor devices and prevent peeling off (column 2 thru 3). The layer should be at least 10 micrometers thick to function to dissipate in plane heat but not more than 200 micrometers (see column 4 lines 30-60). The substrate should be much thicker than the thin diamond film with exemplary thicknesses being from 200 to 1000 micrometers (column 4).

4. However Saito is silent as to the a CVD grown layer epitaxially bonded to a substrate.

5. Zhu teaches a diamond film formed via CVD methods (abstract). The CVD film is formed on a substrate having diamond grains deposited on the surface of the substrate

and incorporated into the matrix material (usually Ni) (see figure 2). The diamond particles are partially embedded into the surface of the substrate with diamond grains being exposed to the surface (figure 2). The examiner is considering the partially embedded diamond particles to be a (DL) material having “diamond particles in a matrix” and also having surface with exposed diamond particles as claimed. The diamond films are considered to be hole and free and continuous to the extent to which applicant has defined the terms (see examples). The film is inherently “at least in part” bonded to the particles by epitaxy because the diamond film is formed on the diamond particles in a CVD process substantially similar to applicant’s process.

6. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the substrate and growth and adhesion method of Zhu in order to provide a diamond film with good adhesion and growth on a non diamond substrate (applicant’s DL layer) and taking advantage of the excellent heat dissipation qualities of the diamond layer (see column 1 Zhu).

7. Zhu is silent as to the size of the diamond grains or the percentage exposed to the surface.

8. Regarding the percentage exposed, generally, differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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9. It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the percentage of exposed surface in contact with diamond grains and in so doing provide greater than 30% or greater than 70% exposed surface epitaxy of the DL/ CVD layer interface by providing optimal diamond nucleation sites in order to grow a high quality well adhered diamond film covering the entire surface of the substrate of Zhu that doesn't peel off and has good adhesion to the substrate (wherein the non diamond substrate of Zhu won't grow diamond). No patentable distinction is seen.

10. Regarding the grain (or crystal) size of the DL layer one of ordinary skill would also have found it obvious to provide a grain size of at least 10 micrometers with a thickness four times greater than the thickness of the CVD layer because such a size would be within the scale of the disclosed thicknesses of the substrate and CVD layers taught by Saito especially wherein thinner CVD layer of 10 or 20 micrometers are used (within the disclosed thicknesses taught by Saito above) and providing larger nucleating diamond particles in the DL layer (substrate) matrix which is depicted as much thicker (see figures Saito), wherein the layer is several hundred micrometers thick, providing a grain size of 40-80 micrometers (for a 10-20 micrometer thick CVD thickness) would provide grains that are exposed on one side of the DL but not the other, and one of ordinary skill would optimize the sizes to within this claimed range providing a well adhered diamond film covering the entire surface of the substrate of Zhu that doesn't peel off and has good adhesion to the substrate (wherein the non diamond substrate of Zhu won't grow diamond). No patentable distinction is seen.

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11. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

12. Regarding claim 54, it would have been obvious to provide the structure claimed by applicant wherein the two opposing sides having the diamond film taught by Zhu in order to interface as a heat spreader with two opposing surfaces (i.e. A heat source and a heat transfer device) as is common in thermal interface system known in the art.

13. Regarding claims 55 and 56, the particles incorporated into the metal matrix and are part of the surface of the substrate (as in figure 2) is considered to result in deliberately enhanced epitaxy bonding.

14. Regarding claims 78-80, the material of Saito is used as a heat spreader and would meet the claim limitations or in the alternative would be obvious to provide given the diameter of the particles of diamond material and the structural limitations of the material.

Response to Arguments

15. Applicant's arguments filed 10/1/2009 have been fully considered but they are not persuasive.

16. Applicant has argued that the parts of the Zhu reference not cited are not relevant to a determination of obviousness. The examiner disagrees. The examiner can look to a variety of sources that demonstrate what was known to one of ordinary skill in the art at the time of the invention (see KSR). Applicant has the duty to read and argue against the entirety of the cited reference and can not ignore clear teachings of the cited reference.

17. Regarding the grain (or crystal) size of the DL layer one of ordinary skill would also have found it obvious to provide a grain size of at least 10 micrometers with a thickness four times greater than the thickness of the CVD layer because such a size would be within the scale of the disclosed thicknesses of the substrate and CVD layers taught by Saito especially wherein thinner CVD layer of 10 or 20 micrometers are used (within the disclosed thicknesses taught by Saito above) and providing larger nucleating diamond particles in the DL layer (substrate) matrix which is depicted as much thicker (see figures Saito), wherein the layer is several hundred micrometers thick, providing a grain size of 40-80 micrometers (for a 10-20 micrometer thick CVD thickness) would provide grains that are exposed on one side of the DL but not the other, and one of ordinary skill would optimize the sizes to within this claimed range providing a well adhered diamond film covering the entire surface of the substrate of Zhu that doesn't peel off and has good adhesion to the substrate (wherein the non diamond substrate of Zhu won't grow diamond). No patentable distinction is seen.

18. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections

are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

19. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

20. In response to applicant's argument that Zhu does not teach the diamond grain structure as claimed, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

21. Rejection maintained.

Conclusion

22. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **DANIEL MILLER** whose telephone number is (571)272-1534. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/
Supervisory Patent Examiner, Art Unit 1794

/Daniel Miller/
Examiner, Art Unit 1794